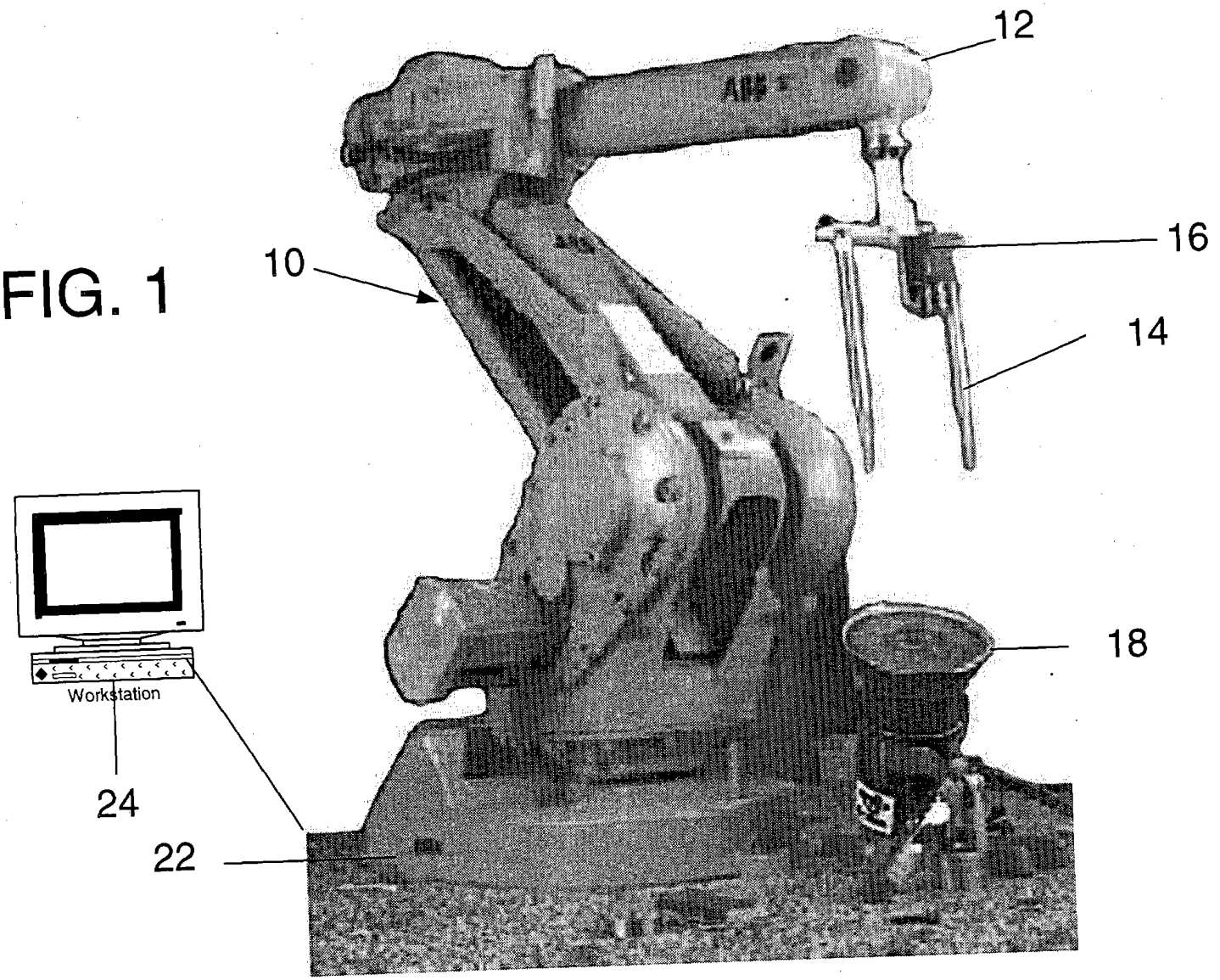
FIG. 1



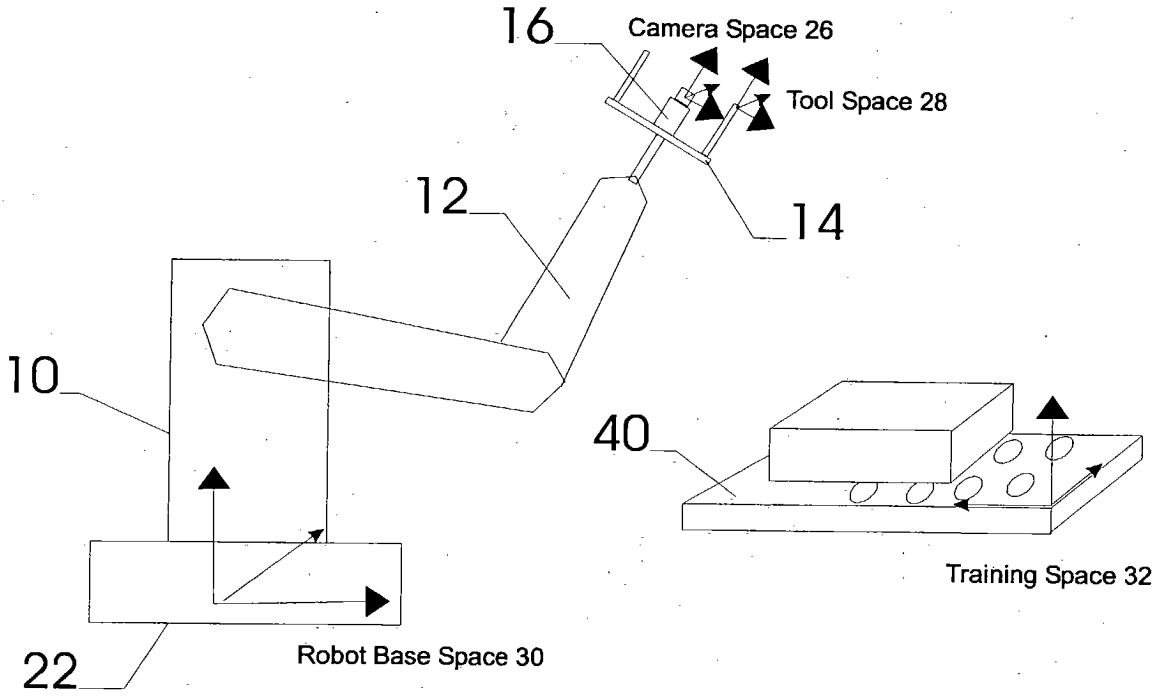
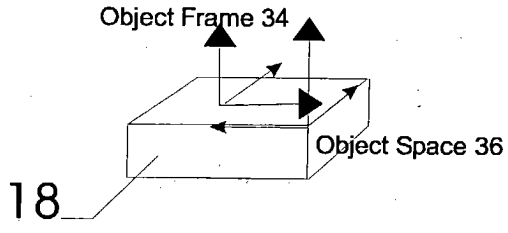

16
Camera Space 26
Tool Space 28
12
14
10
40
Training Space 32
22
Robot Base Space 30

Fig. 2


Object Frame 34
Object Space 36
18

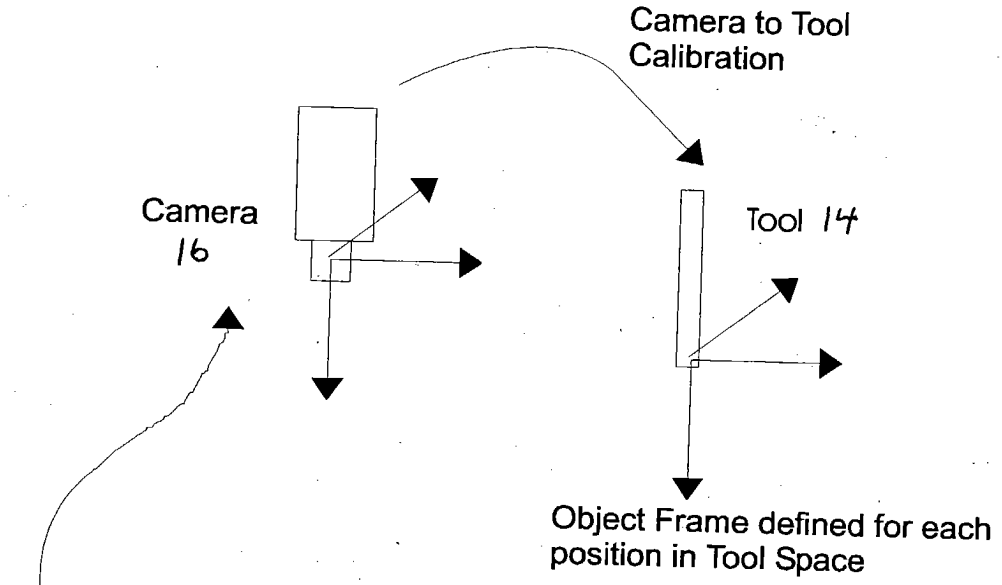

Camera to Tool
Calibration
Camera
16
Tool 14
Object Frame defined for each
position in Tool Space

Fig. 3

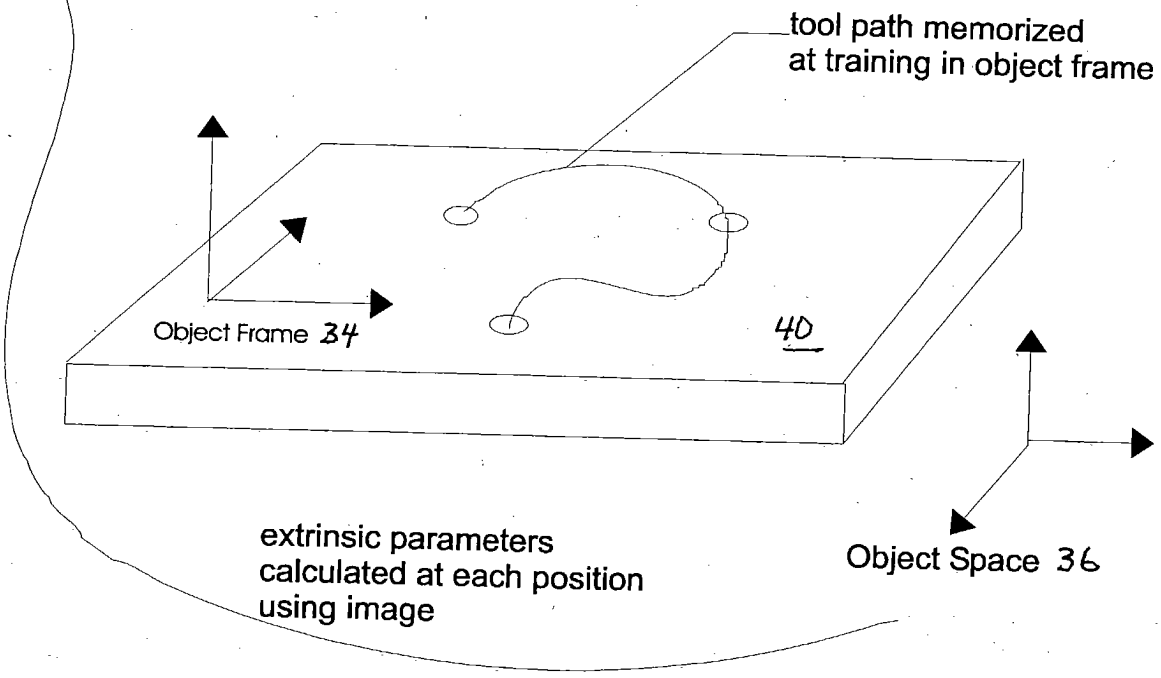
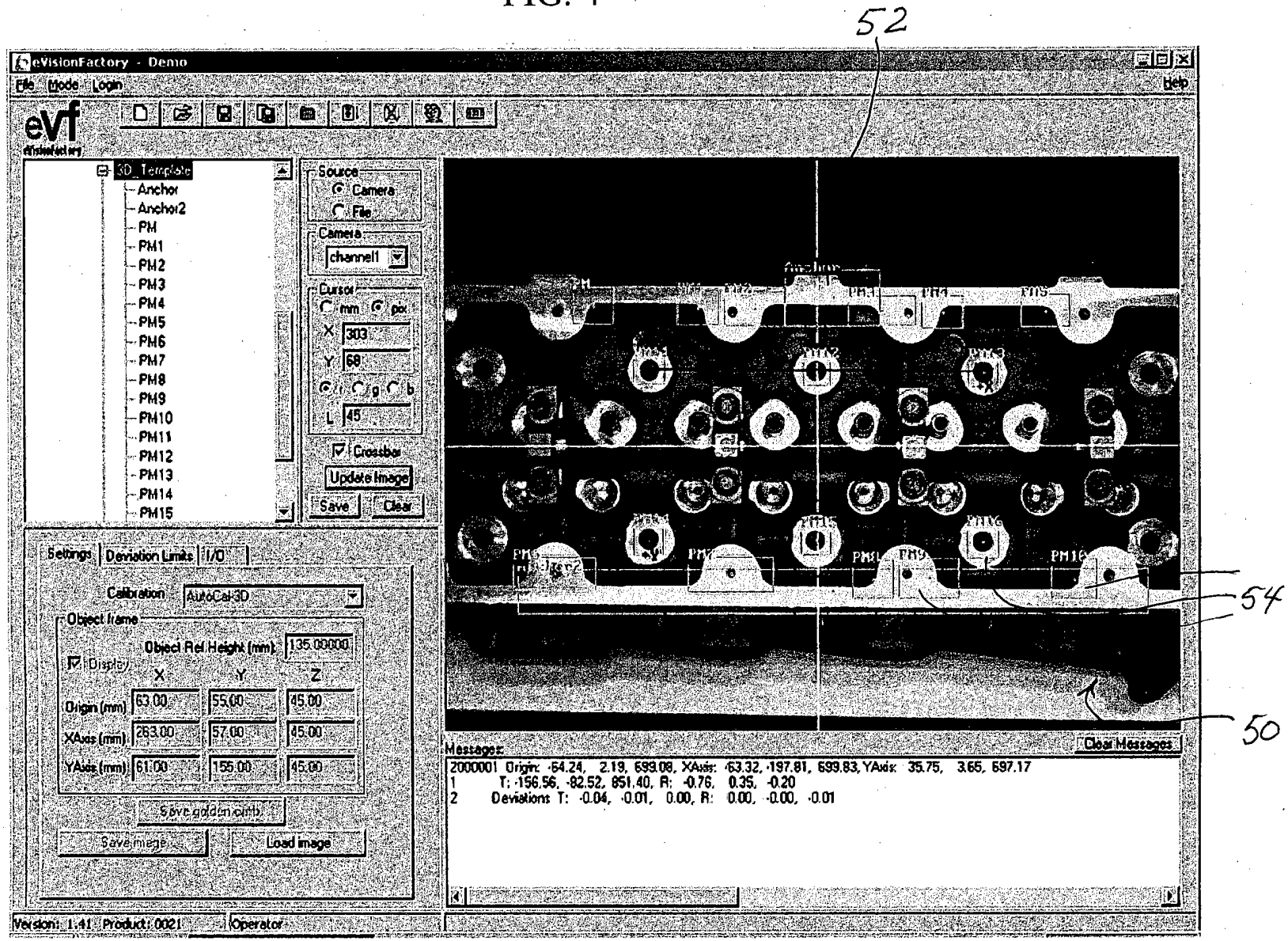

tool path memorized
at training in object frame
Object Frame 34
40
extrinsic parameters
calculated at each position
using image
Object Space 36

FIG. 4


52
54
50
eVisionFactory - Demo
File Mode Login
Help
3D_Template
Anchor
Anchor2
PM
PM1
PM2
PM3
PM4
PM5
PM6
PM7
PM8
PM9
PM10
PM11
PM12
PM13
PM14
PM15
Source
Camera
File
Camera
channel1
Cursor
mm
pix
X 303
Y 68
L 45
Crossbar
Update Image
Save
Clear
Settings
Deviation Limits
I/O
Calibration
AutoCal-3D
Object Frame
Object Ref Height (mm) 135.00000
Display
X
Y
Z
Origin (mm) 63.00 55.00 45.00
XAxis (mm) 263.00 57.00 45.00
YAxis (mm) 61.00 155.00 45.00
Save golden comb
Save image
Load image
Messages:
Clear Messages
2000001 Origin: -64.24, 2.19, 699.08, XAxis: -63.32, -197.81, 699.83, YAxis: 35.75, 3.65, 697.17
1 T: -156.56, -82.52, 851.40, R: -0.76, 0.35, -0.20
2 Deviations T: -0.04, -0.01, 0.00, R: 0.00, -0.00, -0.01
Version: 1.41 Product: 0021
Operator

Calibration of the camera mounted on the robot arm

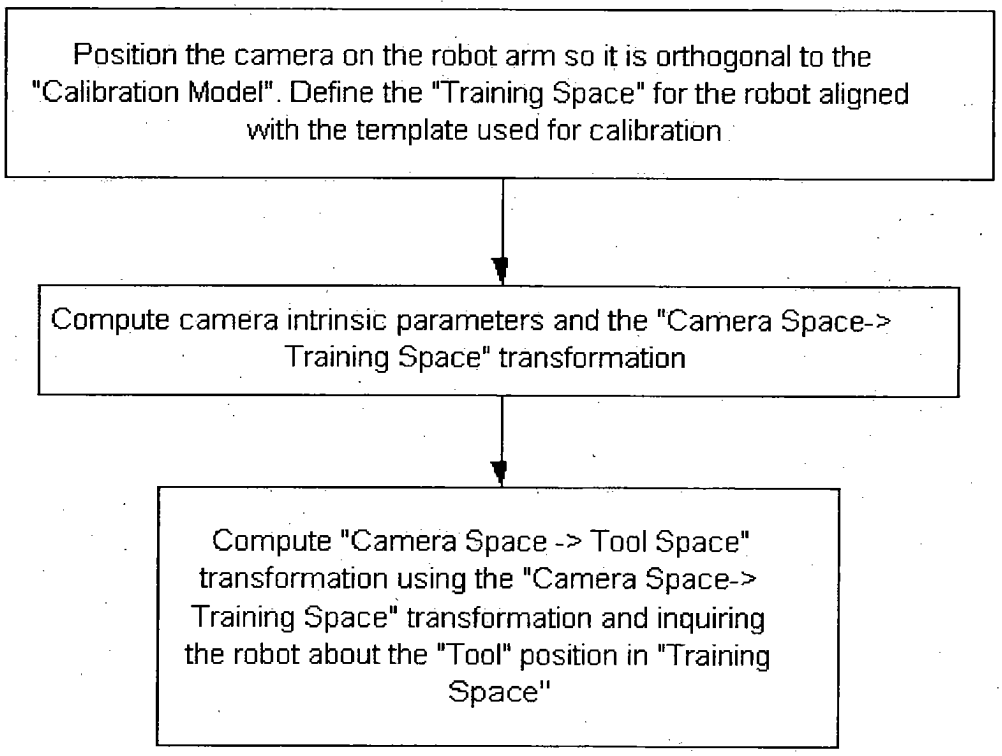


FIG. 5

Teaching The Object Features & Robot Operation Path

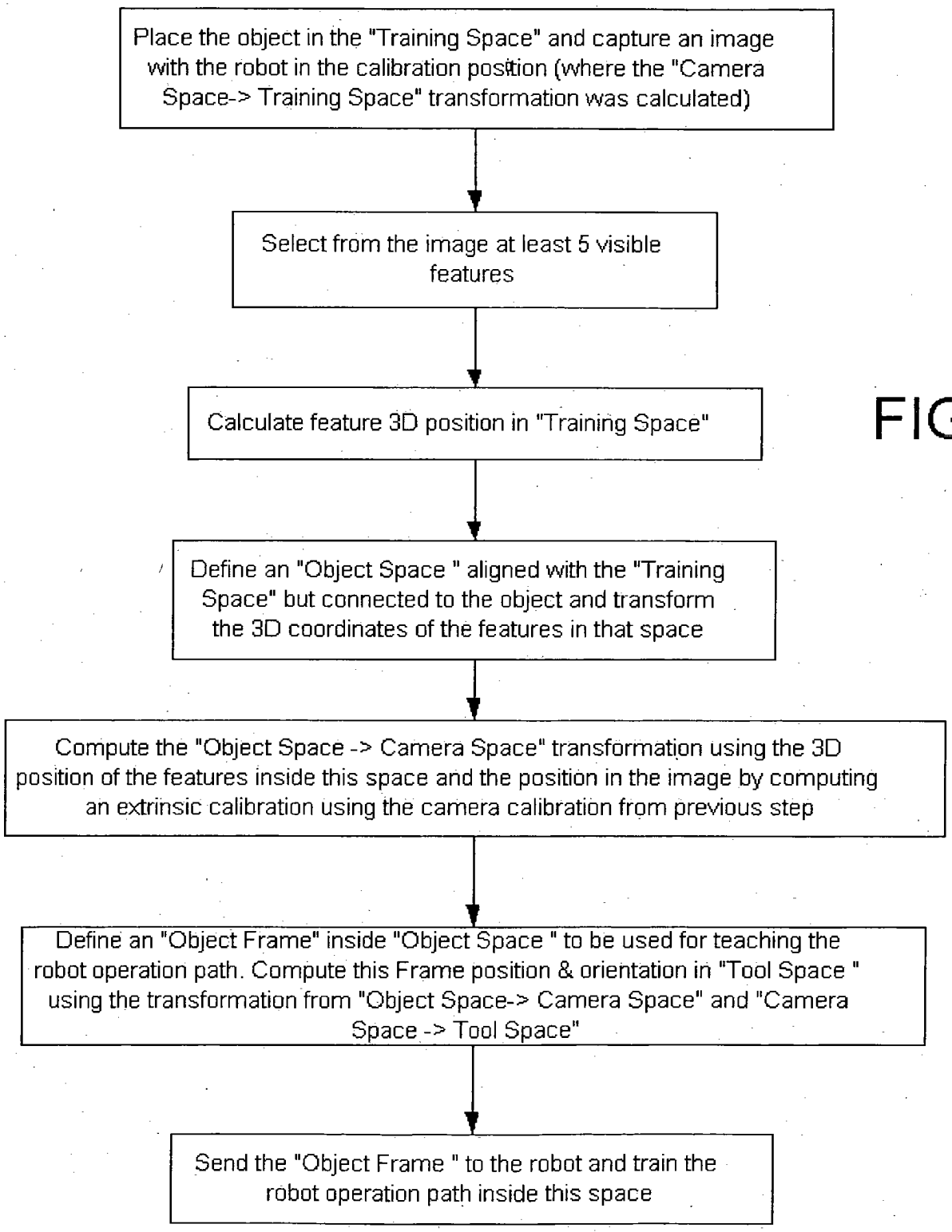


FIG. 6

Object Positioning and Robot Guidance

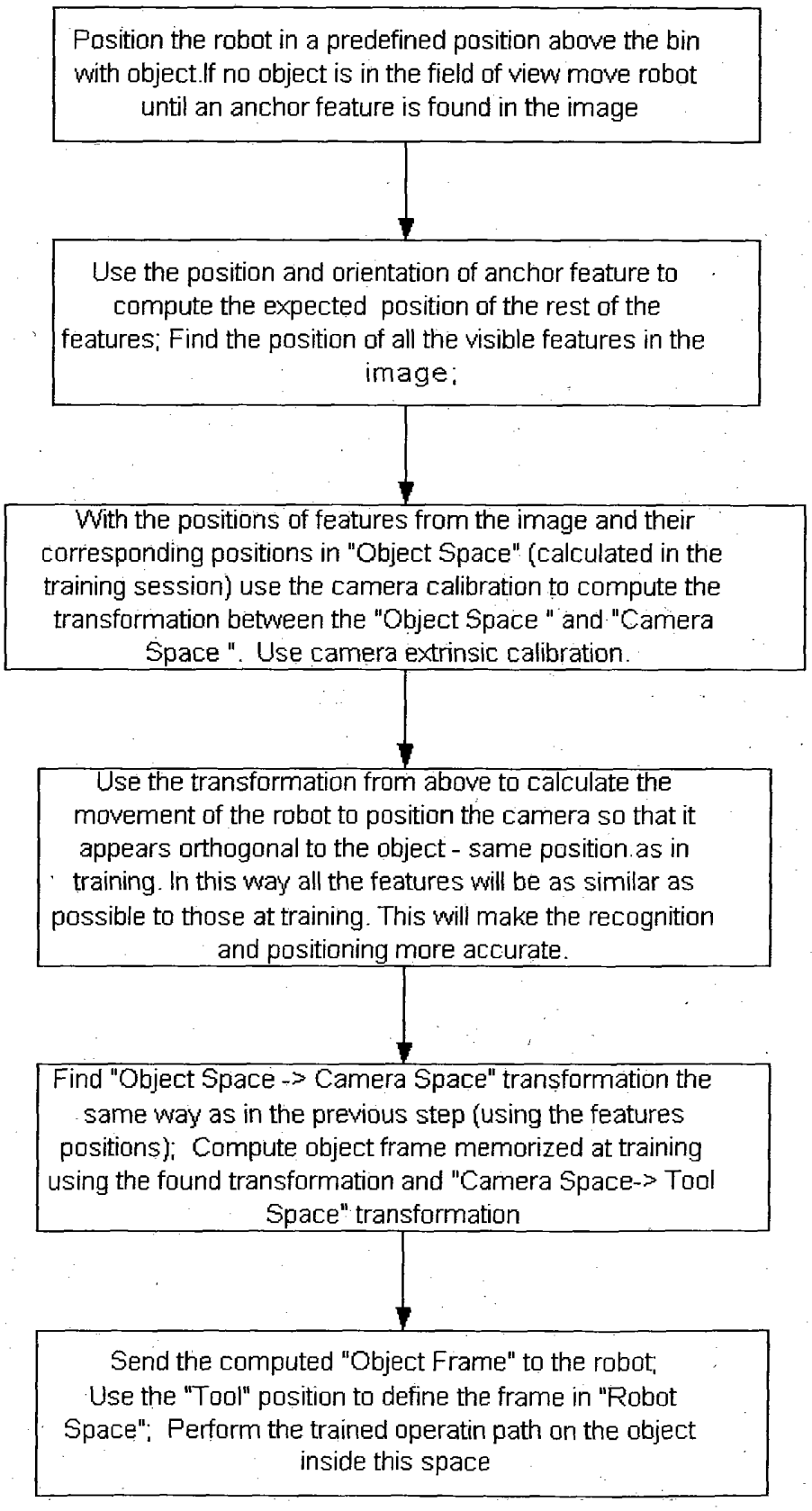


FIG. 7